

AR36

File

AUG 20 1960



INTERNATIONAL POWER AND ENGINEERING CONSULTANTS LIMITED



Digitized by the Internet Archive
in 2023 with funding from
University of Alberta Library

https://archive.org/details/Inte1888_0000



INTERNATIONAL POWER AND ENGINEERING CONSULTANTS LIMITED

570 DUNSMUIR STREET, VANCOUVER 2, BRITISH COLUMBIA, CANADA

AN ORGANIZATION DESIGNED TO PROVIDE SERVICE AS CONSULTING ENGINEERS ON A WORLD-WIDE BASIS



HEAD OFFICE BUILDING, INTERNATIONAL POWER AND ENGINEERING CONSULTANTS LIMITED

THE COMPANY

IPEC is a new name in engineering, although it represents half a century of engineering experience. Teams under the leadership of present management have translated into steel and concrete some of the most imaginative concepts of the last two decades.

IPEC and its precursors have, since the beginning of the century, prosecuted a most vigorous development in the southerly regions of British Columbia, and during the post war years have met an engineering challenge unequalled in the history of Western Canada. They have carried the responsibility for the engineering, construction, and commissioning of nine separate hydroelectric projects, totalling close to 1,000,000 kilowatts, in one of the most mountainous and rugged areas in the world. Allied to these hydro developments, they have designed, developed, and built a major transmission network together with the supporting substations and distribution system, involving a total cost in the order of \$500 million. During this period the generating capacity in the area has been increased in the order of five times.

In order to carry out this major development program, IPEC have:

- pioneered the first six-nozzle vertical high head water turbines
- designed and built the first 360 kv high voltage transmission line in North America
- initiated and developed the large scale use of automation and remote control in electric plants and substations
- engineered and built one of the longest high voltage transmission spans in the world
- initiated and assisted in the design and installation of the largest capacity high voltage submarine power cable link in the world, involving continuous links of 138 kv submarine cable, each 14½ miles in length.

During the past five years IPEC have designed and built the world's largest gas turbine plant – 100,000 kilowatt capacity in four units; a completely automatic and remotely controlled station. Together with its associate company Balfour Beatty and Company Limited, IPEC have designed and are in the process of building a six unit, gas or oil fired thermal plant having a total capacity of 945,000 kilowatts.

Balfour Beatty, one of the largest British companies in power and industrial design and construction, have an international reputation and extensive experience throughout the world. Formed in London, England in 1906, they have grown from an original capital of £50,000 to their present net worth of over £5,000,000. This development has been paralleled by corresponding development in technical skills, now at the service of IPEC's clients.

With the recent association of IPEC and Balfour Beatty Overseas Limited, the two complimentary groups have been strengthened to form an outstanding team.

IPEC have carried out initial surveys, feasibility studies, and are presently engaged in the design of one of the largest hydroelectric projects in the world – the Peace River Power Development. Studies showed that about 9 million horsepower could be developed from the Peace River, the Liard River, and their tributaries. Designs are already under way on two plants which will utilize almost half of this potential, one with a capacity of 3,400,000 h.p., and the other with a capacity of 820,000 h.p.

The experience gained in working on this and other major projects illustrated in this brochure, makes IPEC eminently qualified in the field of utility, commercial, and industrial development. This experience is available to IPEC clients throughout the world.



INTERNATIONAL POWER AND ENGINEERING CONSULTANTS LIMITED
570 DUNSMUIR STREET, VANCOUVER 2, BRITISH COLUMBIA, CANADA

DIRECTORS

SIR ANDREW MacTAGGART, K.B. *Chairman of the Board*

A. E. GRAUER, LL.D. *Deputy Chairman of the Board*

T. INGLEDOW, D. Sc. *President and Chief Executive Officer*

H. W. SMITH *Executive Vice-President*

K. H. KIDD *Vice-President*

W. I. O'HARA *Vice-President*

SIR THOMAS FOY, K.B. *Director and Consultant*

A. B. ROBERTSON, Q.C. *Director*

R. H. R. MCGILL *Director*

SIR ANDREW MacTAGGART, K.B.

Chairman of the Board

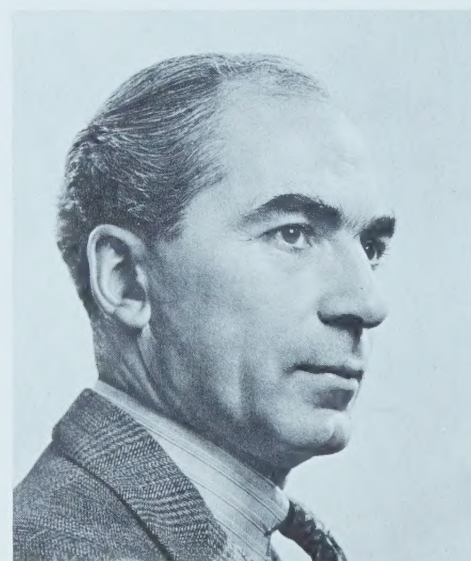
Chairman of the Board of Balfour, Beatty & Co. Limited, Balfour, Beatty (Overseas) Ltd., Peace River Power Development Company Ltd. and President of Balfour, Beatty & Co. (Canada) Ltd., Sir Andrew MacTaggart is a noted civil engineer who was responsible for large hydroelectric, irrigation and railway works in the British Isles, Italy, India, East Africa and Iraq, before assuming executive direction of a large number of important business firms. He is Chairman and Managing Director of Power Securities Corporation Ltd., Chairman of the London Board of East African Power & Lighting Co. Ltd., Tanganyika Electric Supply Co. Ltd. and Kenya Power Co. Ltd., Chairman of the Board of Stent Precast Concrete Ltd., Impervious Stone Co. Ltd., Metropolitan Construction Co. Ltd., Duncan Watson (Electrical Engineers) Ltd. Director of Building Developments Ltd., and G. H. Osborn Building Products Ltd.

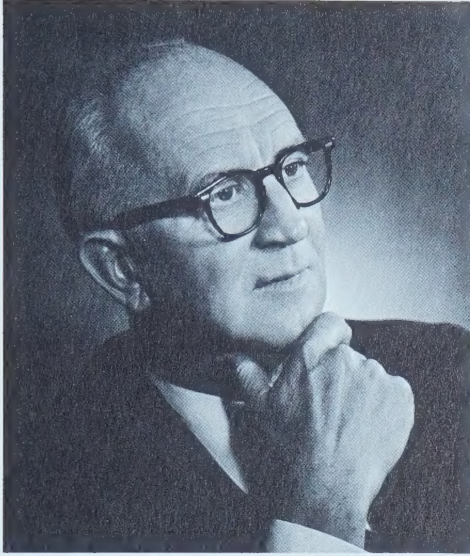


A. E. GRAUER, PH.D., LL.D.

Deputy Chairman of the Board

Chairman and President of British Columbia Power Corporation, Limited, and British Columbia Electric Company Limited, Dr. Grauer is widely regarded as one of Canada's most able business leaders. His counsel is highly valued by industrial concerns, governmental bodies and organizations devoted to national affairs. He is on the Board of Directors of Sun Life Assurance Co. of Canada, The Royal Bank of Canada, Montreal Trust Company, Canadian Chemical Co. Ltd., MacMillan, Bloedel & Powell River Ltd., Webb & Knapp (Canada) Ltd., Dominion Bridge Co. Ltd., Ventures Ltd., Investors Syndicate of Canada Ltd., Canadian Liquid Air Co. Ltd., Ford Motor Company of Canada. Dr. Grauer was a member of the Royal Commission on Canada's Economic Prospects. He is a board member of the International Chamber of Commerce, member of the Canadian Council of the National Industrial Conference Board, member of the Advisory Committee on Atomic Power to Atomic Energy of Canada Ltd., member of the Dollar Sterling Trade Board. Dr. Grauer is also Chancellor of the University of British Columbia.





THOMAS INGLEDOW, B.Sc., M.A., D.Sc., FELLOW A.I.E.E., M.E.I.C., P.ENG.
President and Chief Executive Officer

Dr. Ingledow has received wide recognition as one of Canada's leading engineers. He has been elected President or Vice-President of many of Canada's engineering associations including the Association of Professional Engineers of British Columbia, and the Canadian Electrical Association. He has served on several Governmental bodies such as the Defence Research Board of Canada, and the British Columbia Government's Columbia River Basin Development Committee. In the international sphere, Dr. Ingledow is a Past-President of the Northwest Electrical Light and Power Association, a Past Vice-President of the American Institution of Electrical Engineers, and has served as a member of the Governors Power Policy Committee of the Northwest United States of America.

During the past twenty years of executive responsibility for the engineering design, construction and operation of the B.C. Power Corporation group of companies, Dr. Ingledow has carried through a \$500,000,000 expansion program, increasing by five times the companies' operations in electric power, gas and transportation. Dr. Ingledow is past president of The Vancouver Art Gallery and is currently Honorary President. He is Honorary Colonel, Royal Canadian Artillery, and Honorary Group Captain, Royal Canadian Air Force.



INTERNATIONAL POWER AND ENGINEERING CONSULTANTS LIMITED
570 DUNSMUIR STREET, VANCOUVER 2, BRITISH COLUMBIA, CANADA

IPEC IS EQUIPPED TO UNDERTAKE

Engineering Reports and Surveys

Engineering Design

Research, Testing and Inspection

Supervision of Construction

Commissioning into Service

IN THE FOLLOWING FIELDS

Industrial Sites, Buildings and Plants

Heavy Construction Dams, Bridges, Waterworks, Railroads, Highways

Hydroelectric Generation Dams, Tunnels, Powerhouses

Thermal Electric Generation Steam or Gas Turbines

Nuclear Electric Generation Facilities

*High Voltage Transmission, Distribution, Substations, Remote Control, Communication
and Protection for Electric Utilities*

Natural Gas Transmission and Distribution Systems with Associated Facilities

Electric Railway and Trolley Coach Transportation Systems

UTILIZING THE FOLLOWING FACILITIES

An experienced staff of over 300 engineers, scientists, draftsmen and technicians

A modern air-conditioned design office with excellent library, drafting and reproduction facilities.

Representation on numerous national and international technical committees.

A fully equipped network analyzer for power systems analysis.

A specialist staff trained in the use of a high speed digital computer.

A full complement of survey and special test equipment.



BRIDGE RIVER HYDROELECTRIC DEVELOPMENT

LA JOIE DAM – Initial storage for Bridge River hydro complex. This 250 foot high major rock fill dam is 3,500 feet in length at the crest and 680 feet wide at the base. The dam provides 584,000 acre feet of storage for utilization in the Bridge River and Seton Lake plants with installations totalling 500,000 kw.





2 THESE TWO HIGH-HEAD POWER PLANTS form the key generating facilities for the comprehensive development of Bridge River. The first development, on the right, comprises four 50 mva generating units served by four 6 foot diameter steel surface penstocks and a 14 foot diameter concrete lined tunnel through Mission Mountain 11,290 feet long. This plant pioneered in the utilization 6 nozzle vertical-shaft impulse turbines. The second development comprises four 62 megawatt units served by two 9.5 foot diameter steel surface penstocks and a 16.5 foot diameter concrete lined tunnel 12,700 feet long. Construction work on this project started in 1957.



3 SETON LAKE DEVELOPMENT – Water from the La Joie reservoir is utilized once again to develop power at Seton Lake. A 40 foot high dam at the outlet of Seton Lake diverts flows up to 5,000 feet per second through a 12,600 foot long power canal. The powerhouse, which contains one 58,500 horsepower Francis turbine rated at a 147 foot net head, is completely unattended. Unusual features are the five large siphon spillways used in the dam to supplement the gated spillway, and the fishladders to facilitate passage of salmon into Seton Lake.



RUSKIN POWER DEVELOPMENT – This development located on the Stave River in British Columbia has been in continuous operation since 1930. It now comprises a concrete gravity dam 195 feet high and 420 feet long, three – 359 foot long tunnel penstocks 19 feet in diameter and a powerhouse containing three 47,000 horsepower Francis turbines rated at 124 feet head. The third unit was added in 1950; a fourth unit can be installed to give an ultimate total capacity of 188,000 horsepower.



CLOWHOM DEVELOPMENT – This 71 foot high, 1,320 foot long concrete gravity dam astride the Clowhom River creates a 175 foot head at a 40,000 H.P. remotely controlled powerplant situated on the shores of a picturesque inlet in the mountains north of Vancouver, B.C. The large, 14 foot diameter, steel penstock is about 1,000 feet long.



WAHLEACH – One of the highest head plants in North America. The power conduit conveying the water from Wahleach Lake reservoir to the powerhouse on the bank of the Fraser River comprises two miles of 9 foot diameter unlined tunnel, 3,000 feet of 6 foot diameter steel lined tunnel penstock, and 1,700 feet of 5.8 foot diameter steel surface penstock. The 82,000 horsepower six nozzle impulse turbine operates under about 2,000 foot head, and is controlled from a load dispatch office in Vancouver 65 miles away.



CHEAKAMUS DEVELOPMENT – One of the world's largest unattended generating stations, the Cheakamus plant is remotely controlled from a load dispatch centre 50 miles away. The powerhouse contains two 95,000 horsepower Francis turbines rated at 954 feet net head. The dam has an earth-fill section founded on slide material and a concrete gravity section with a gated spillway, a free crested spillway and low level outlets. The 18 foot diameter, partly-lined tunnel is almost 7 miles long. The two 8.75 foot diameter, high pressure, surface penstocks are each 1,700 feet in length.



THE PEACE RIVER HYDROELECTRIC POWER DEVELOPMENT – One of the world's largest hydroelectric developments is now being designed. The proposed Portage Mountain Dam will be 600 feet high and 7,000 feet in length. It will create one of the largest man-made lakes – a storage reservoir 200 miles long impounding some 88,000,000 acre feet of water. The 2,535 megawatt power plant will feed the British Columbia lower mainland by three extra-high voltage transmission lines each 600 miles long. These 500,000 volt lines will represent a significant step forward in the bulk transmission of electrical power.



BURRARD THERMAL GENERATING STATION – Three-quarters of a million cubic yards of rock were blasted before construction commenced on this project near Vancouver, B.C. The 945 megawatt steam generating plant will have six-157.5 mw, 1800 p.s.i., 1000°F., impulse type, close coupled, three cylinder hydrogen cooled turbo-generators. Each outdoor reheat boiler will have a capacity of 1,050,000 pounds of steam per hour and is designed to fire either natural gas, crude oil or residual oil. The project is scheduled for completion at an overall cost of less than \$100 per kilowatt.



PORT MANN GAS TURBINE GENERATING STATION – The world's largest turbine plant: fully automatic and remote controlled. The low cost 100,000 kilowatt Port Mann Gas Turbine Plant firms up secondary hydro power and provides standby generating capacity in emergency. The four 25,000 kw two-stage, twin-shaft, open-cycle gas turbines are fully automatic and unattended and will be controlled by a microwave and carrier communications system from a control room some 15 miles away.



230 KV UNDERGROUND TRANSMISSION CABLES – The most extensive 230 kv underground duct cable installation in North America. The initial installation was made in 1957. At present there are 18 circuit miles of cable, the first stage of a subtransmission system which will utilize ultimately about 135 miles of oil-filled single-phase 230 kv cables, laid in duct.





360 KV TRANSMISSION LINES – The first 360 kv line in North America. This 196 mile line, completed in 1957, traverses rugged terrain. The single circuit steel transmission tower line utilizes twin bundle 795 MCM ACSR conductors, horizontally spaced. Another 85 miles of 360 kv line are under construction.



138 KV SUBMARINE CABLE – The largest submarine cable system in the world. The shore ends of the seven-14½ and seven-3 mile long cables were laid by the specially modified scow seen approaching the prepared cable chases from the cable ship. The seven cables, manufactured in continuous lengths, form part of a 43 mile 240,000 kilowatt interconnection.



132 KV TRANSMISSION LINE - CROSSING JERVIS INLET, BRITISH COLUMBIA - One of the longest crossings in the world. This 10,101 foot span crossing Jervis Inlet, a navigable waterway, is part of a 100 mile 132 kv transmission line constructed along the rugged south-west coast of British Columbia.

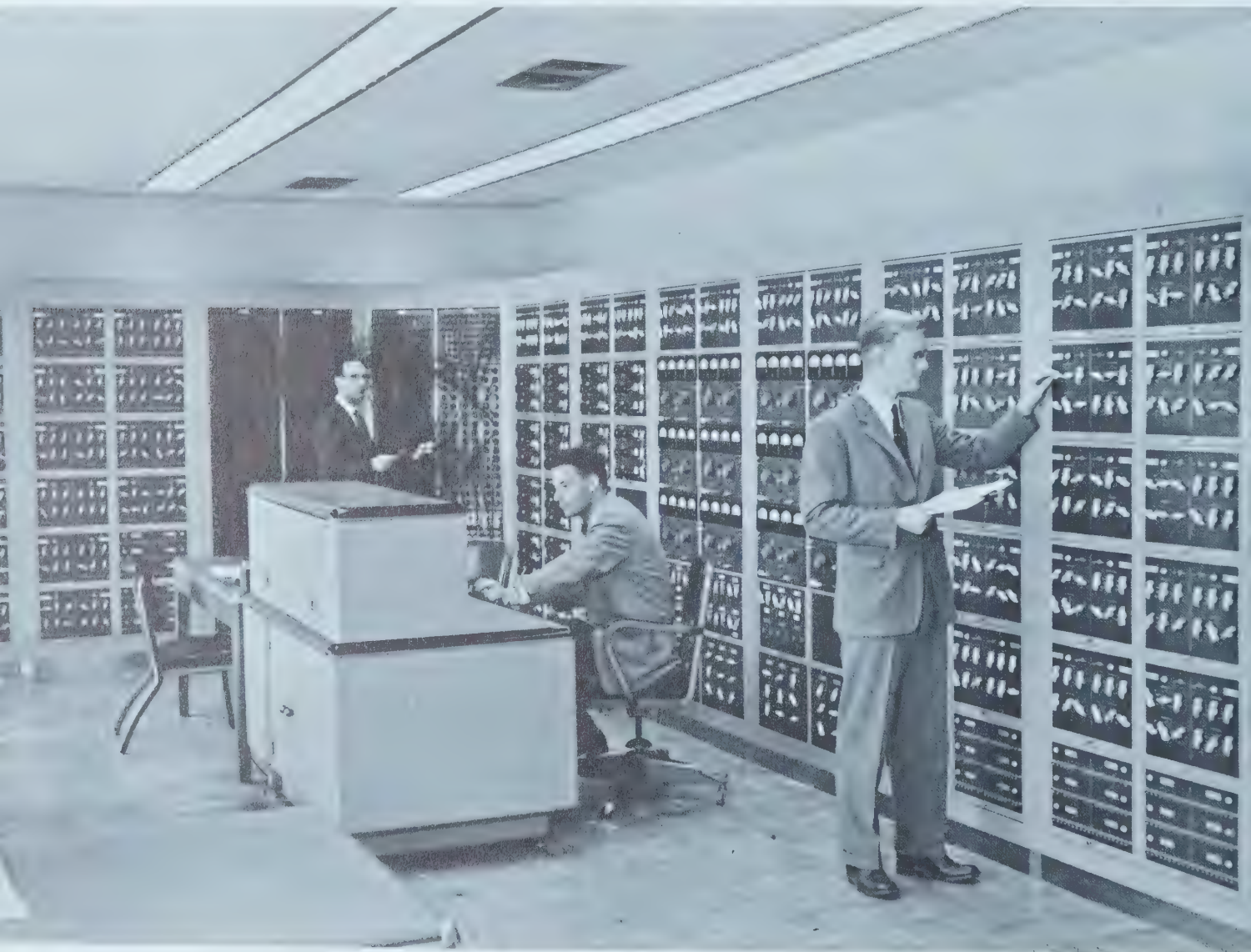


DAL GRAUER SUBSTATION – Planned to blend architecturally with nearby buildings. Located in the downtown area of Vancouver, B.C., this substation has a capacity of 100,000 kva and serves 4 and 12 kv feeders in the adjacent downtown area. Supply to this station is via 60 kv underground cables.

INGLEADOW TERMINAL STATION – The major receiving station for the city of Vancouver is also one of the largest in Canada, planned for an ultimate installed transformer capacity in excess of 2,000,000 kva.



PLANNING STUDIES AND FEASIBILITY REPORTS - An A-C Network Analyzer is located in the Company's Head Office Building. This equipment together with an IBM 650 electronic digital computer makes it possible for company engineers to deal quickly with complex problems.





OAKRIDGE TRANSPORTATION CENTRE – Complete service facilities for the largest trolley bus fleet in Canada. This 13.5 acre modern transit depot was part of the major conversion program undertaken between 1944 and 1955 when Vancouver street railway network was replaced by rubber tire trolley coaches. The depot provides comprehensive servicing facilities for some 400 vehicles.

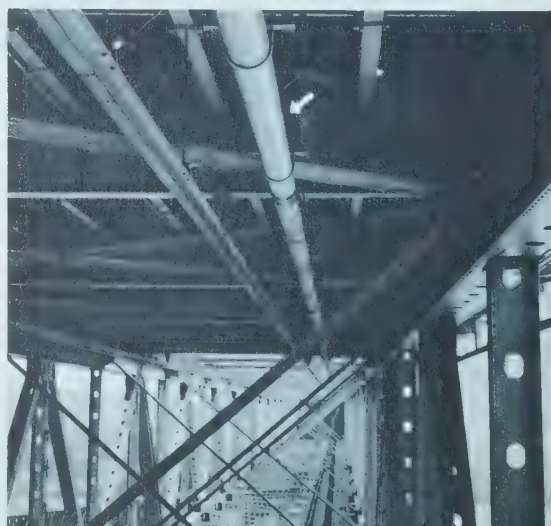
INDUSTRIAL BUILDINGS – This combined administration building, workshop and warehouse for a gas distribution centre was constructed in 1956. The administration building is of curtainwall construction with porcelain enamelled steel panels on an aluminum structural grid. The warehouse has a roof of prestressed, precast concrete beams and precast concrete slabs on reinforced concrete columns. The exterior walls of the warehouse are formed of reinforced concrete panels which were tilted into position after being cast on the floor slabs. The whole structure is supported on concrete-filled steel shell piles.



NATURAL GAS TRANSMISSION LINES AND ASSOCIATED FACILITIES – During the period 1955-1960, gas transmission lines varying in size from 6 to 30 inches in diameter were installed to operate under pressures as high as 600 p.s.i. These transmission lines involved many special bridge and submarine crossings and associated with them were liquified gas-air plants, gate stations, metering, regulating stations and other such installations.



BRIDGE CROSSINGS – Two 10-inch 4,300 foot long natural gas pipelines carry gas across the new Second Narrows Bridge at Vancouver. Each pipeline is secured from the underside of the deck of the bridge, with expansion being taken up in sixteen flexible stainless steel joints.





LIQUID PETROLEUM storage tanks with inlet and outlet manifolds comprise part of a gas-producing plant designed for an initial output of 10 million cubic feet of gas per day.



RIVER CROSSINGS – A section of concrete-covered 20-inch natural gas pipeline moved into position for a submerged $\frac{1}{2}$ -mile crossing of the Fraser River in the vicinity of Tilbury Island.

BALFOUR, BEATTY & CO., LIMITED IN THE UNITED KINGDOM



STAYTHORPE A located on the River Trent in Nottinghamshire, England, was one of the first postwar central stations designed and constructed in U.K., for the British Electricity Authority. Staythorpe A is a coal-fired thermal station with a generating capacity of 360,000 kw comprising six – 60,000 kw, 900 lb./sq. in., 900°F. units and was completed in 1956.



STAYTHORPE B – Balfour Beatty were entrusted with the design and construction of a second station of 360,000 kw capacity, comprising three – 120,000 kw, 1500 lb./sq. in., 1000°F. units. The Staythorpe project when completed will form one of the largest generating stations in the United Kingdom, with an estimated total cost of approximately \$100 million.

CARMARTHEN BAY—In South Wales the design and construction of Carmarthen Bay Generating Station was completed for the British Electricity Authority in 1957. This station has a total capacity of 345,000 kw comprising two – 52,500 kw, 900 lb./sq. in., 900°F. units and four – 60,000 kw, 900 lb./sq. in., 900°F. units. Located on fine sand dunes 70 ft. in depth the design of this station was notable for many special foundation problems, the solution of which involved the largest single wellpoint dewatering system used in the United Kingdom at that time and a steel sheet pile cofferdam believed to be one of the largest ever attempted.



BALFOUR, BEATTY & CO., LIMITED IN OTHER COUNTRIES

In addition to the foregoing major projects, our associated company, Balfour, Beatty & Co., Limited, have for 50 years enjoyed an international reputation as specialists in the field of Management, Financing, Design, Construction and Operation of power projects and utility undertakings. The following are typical of the company's spheres of operation and their advice and staff will be available to IPEC as required.

EAST AFRICA

Management and design of Hydro Electric, Steam and Diesel Generating Stations with associated transmission and distribution networks in Kenya Colony and Tanganyika Territory for the East Africa Power & Lighting Co. Ltd. and the Tanganyika Electric Supply Co. Ltd. Design and construction of a 300-mile transmission line link between the Owen Falls power station in Uganda and Nairobi for the Kenya Power Co. Ltd.

MALAYA

Management and design of Hydro Electric and Steam Generating Stations with associated transmission and distribution networks in the State of Perak for the Perak River Hydro Electric Power Company Ltd.

NIGERIA

Consultants and Technical Advisers to the Nigerian Electricity Supply Corporation. Consulting Engineers in conjunction with Nedeco of Holland to the Federal Government and the Electricity Corporation of Nigeria for the feasibility, investigation and design of a multi-purpose development of the River Niger.

ITALY

Engineering and construction supervision of a Hydro Electric scheme in the Dolomites.

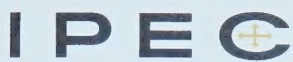
ABYSSINIA

Management of electricity supply undertakings at Addis Ababa, Haraar and Diredaoua.

SOUTH AMERICA

Amongst many activities in the Argentine, the company was responsible for the construction of a power station and distribution system at Santa Fe and the construction of a power station for the Buenos Aires Lacroze Light & Power Co.

In addition to these activities, which are primarily associated with electricity supply, Balfour, Beatty & Co., Limited have executed many other international engineering projects in Iraq, Spain, India and Canada.



PARTIAL LIST OF CLIENTS

AIM Steel Co. Ltd.

Aluminum Company of Canada Limited

B.A. Chemical Co. Ltd.

British Columbia Electric Company Limited

British Columbia Power Commission

Canada Wire & Cable Co.

Cascade Natural Gas Corp. (United States)

Columbia Cellulose Company, Limited

Corporation of the District of Summerland, B.C.

Corporation of the District of Surrey, B.C.

Dow Chemical Company of Canada

English Electric Co. of Canada

Government of the Province of British Columbia

Government of Canada

Grosvenor Laing (B.C.) Limited

Johnston Terminals Ltd.

Magna Pipeline Co.

McKeen & Wilson Ltd.

Mid-Western Industrial Gas Ltd.

Montreal Harbour Commission

Noranda Copper & Brass Co.

Northern Ontario Natural Gas Co.

Panorama Productions Ltd.

Peace River Power Development Co. Ltd.

Shawinigan Chemical Co. Ltd.

Southern California Gas Co.

Western Development and Power Limited



